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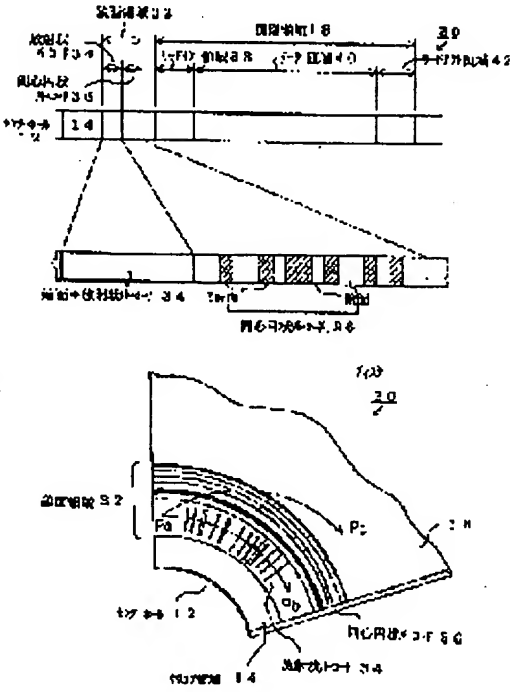
(54) DISK, ITS DISCRIMINATING METHOD AND DEVICE AND ITS REPRODUCING DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To satisfactorily discriminate an illegal copy, to realize versatile and firm security and to simply discriminate a disk even visually.

SOLUTION: A radial bar code 34 is formed on the inner circumferential side of a specular surface area 32 and a concentric circular bar code 36 is formed by a pit string on the outer circumferential side. The radial bar code 34 is read out by moving a beam spot of a pickup from Pa to Pb by rotating a disk 30. The concentric circular bar code 36 is read out by moving the beam spot from Pa to Pc by rotating the disk 30 and also by seeking the pickup. A read-out signal at that time is decoded to obtain the contents of security information bar code-demodulated. The contents are compared with contents stored previously in a memory and the disk is discriminated.



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CLAIMS

[Claim(s)]
[Claim 1]A disk which is a disk including an information area and a coldhearted news field, and is characterized by recording a concentric-circle-shape bar code which makes security information the contents on said coldhearted news field.
[Claim 2]A disk recording a concentric-circle-shape bar code which is the disk with which a radial bar code which makes security information the contents was recorded on a coldhearted news field, and makes security information the contents to said coldhearted news field including an information area and a coldhearted news field.
[Claim 3]The disk according to claim 1 or 2 forming said concentric-circle-shape bar code according to a pit sequence which makes security information the contents.
[Claim 4]A disk identifying method which identifies the disk according to claim 3 at least using one side of security information which is the contents of the pit sequence of security information which is the contents of said concentric-circle-shape bar code, or said concentric-circle-shape bar code.
[Claim 5]An identification unit of the disk according to claim 1, 2, or 3 characterized by comprising the following.
1st memory means; which stores the contents of security information of said concentric-circle-shape bar code -- reading decode means [of ** the 1st which reads and decodes said concentric-circle-shape bar code]; -- security information stored in said 1st memory means.
The 1st identification device that compares contents decoded by said 1st reading decode means, and identifies a disk.;

[Claim 6]An identification unit of the disk according to claim 3 characterized by comprising the following.
2nd memory means; which stores security information of a pit sequence of said concentric-circle-shape bar code -- reading means; which reads pit column information of said concentric-circle-shape bar code -- security information stored in said 2nd memory means.
The 2nd identification device that compares pit column information read by said reading means, and identifies a disk.;

[Claim 7]An identification unit of the disk according to claim 5 or 6 characterized by comprising the following.
3rd memory means; which stores the contents of security information of said radial bar code -- reading decode means [of ** the 2nd which reads and decodes said radial bar code]; -- security information stored in said 3rd memory means.
The 3rd identification device that compares contents decoded by said 2nd reading decode means, and identifies a disk.;

[Claim 8]Playback equipment of a disk having an excluding means which eliminates the disk when it

is identified by said one of identification devices including the identification unit according to claim 5, 6, or 7 that a disk is an illegal copy.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]This invention relates to the improvement to the suitable copy security for the optical disc in which a disk, its identifying method and device, and its playback equipment were started, especially the software for TV games was stored, its discernment, and its playback.
[0002]
[Background of the Invention]Soft products, such as voice software, image software, or a computer program, Copy to various kinds of recording media, for example, a flexible disk, copy to the hard disk of a personal computer, or change can be performed easily, and there is a special feature that copyright infringement breaks out easily. Focusing on application software, such as a game, the actual condition is that much illegal copy articles are especially rampant.
[0003]For this reason, to the medium of soft products, the prevention measure to an illegal copy has performed from the former, and much illegal-copy-prevention art is proposed. It will be divided roughly into the logical technique which identifies an illegal copy in signal, and the physical means which identify an illegal copy on a physical shape target if these techniques are divided roughly. As the fundamental way of thinking, a certain unique code is recorded on the medium itself or the medium exterior logically or physically, and an illegal copy is identified by both by reading this. For example, the unique code which cannot be copied to a recording medium is recorded. Even if it can copy main information which is original information, such as a sound and an image, and a program, a unique code part is not copied. Therefore, if the unique code part is decoded at the time of reproduction, an illegal copy article and a regular article can be distinguished by the existence of the decipherment. Generally, the physical means which need considerable equipment are more effective than the logical technique which can respond with easy equipment.
[0004]For example, to JP,6-282931,A. While reading the ID information of CD-ROM to reproduce from the application program in CD-ROM, As compared with ID of CD-ROM set in playback equipment in this, when in agreement, the CD-ROM playback equipment which was made to execute the application program is indicated. A character string like the catalog number recorded on CD-ROM and "ABC" recorded on the specific file on CD-ROM as ID information which cannot be copied is used.
[0005]In order to prevent from copying security information easily, while putting security information on the field which is not accessed in the usual reproduction machine, the way a special reproduction machine detects it is the most common. As such an example, there are JP,6-203412,A, Nikkei electronics'97.1.6 No. (NO.679) P13, and an optical disc indicated to 14 (international publication W096/16401, Japanese Patent Application No. No. 51520 [eight to]). According to these, the mirror plane outside the information area of disk inner circumference is chosen, and a bar code is recorded there. Actually, what recorded the logo character is used. These also have the advantage that discernment of the regular article and illicit article of a disk can be performed visually.

[0006]
[Problem(s) to be Solved by the Invention]By the way, the consideration from the following viewpoints is needed for prevention of an illegal copy.
(1) It is preferred for security information not to be outputted as main information, but to prevent from discovering from the outside as a basic function of security information record. That is, when it sees from the bus and OS level besides un-visible data and devices, such as SCSI, from the outside of the signal processor of disk data, it records on a disk by using meaningless data as security data, and it is made not to be outputted from the processing unit of main information.
[0007](2) Security information is made not to be reproduced even if it manufactures the disk of an illegal copy based on the data of the main information outputted from the processing unit of the disk. Security information can be read certainly and it enables it to regenerate it normally with a regular processing unit.
[0008](3) Although it is not indispensable, if the compatibility on a standard is maintained based on the physical standard of a disk, the possibility as disk resources, such as concomitant use of a manufacturing installation, increases, and it is desirable. For example, compatibility is maintained by considering it as the physical standard of the disk corresponding to a CD player, the CD-ROM drive of a personal computer, etc., and the same standard.
[0009]However, since the bar code indicated by said JP,6-203412,A is very easy to reproduce, the anti-copying capability is low. Therefore, it is necessary to add security information and to reinforce anti-copying capability. In this case, the optical reproduction means which the usual reproduction machine has can use it as it is, and, as for the addition of new hardware, stopping at the minimum is desirable. It is convenient if it can specifically divert to the record reproduction of the security information which adds the record reproduction means of said bar code as it is. Like said bar code, when it can be checked visually whether it is a regular disk, it is still more convenient.
[0010]While this invention was originated from these viewpoints, and the purpose identifies an illegal copy good and aiming at the prevention, it is being able to respond with simple equipment and also also maintaining compatibility. Other purposes are to realize firm security by various security information. Other purposes are to distinguish simply whether it is a regular article also by viewing.
[0011]
[Means for Solving the Problem]In order to attain said purpose, a disk of this invention recorded a concentric-circle-shape bar code and a radial bar code which make security information the contents on a coldhearted news field. According to one of the main gestalten, said concentric-circle-shape bar code is formed of a pit sequence which makes security information the contents. Disk discernment of this invention is performed by storing beforehand the contents of security information of a pit sequence of said concentric-circle-shape bar code, a radial bar code, or a concentric-circle-shape bar coat in a memory, and comparing the contents and the contents of storing of a memory which were read.
[0012]The above and other purposes of this invention, the feature, and an advantage will become clear from the following detailed explanation and an accompanying drawing.
[0013]
[Embodiment of the Invention]Hereafter, an embodiment of the invention is described in detail. First, in order to make an understanding of this invention easy, the most-inner-circumference portion of the optical disc indicated by JP,6-203412,A mentioned above is explained with reference to drawing 2. The center hall 12 for inserting in the axis of rotation (not shown) is established in the center of the disk 10. The clamp region 14 which does not act as a data storage area is established in the outside. The specular surface area 16 which has a data recording layer is established in the outside. The outside serves as the information area 18, and main information, such as music, an image, and a program, is recorded. The bar code 20 is formed in the specular surface area 16 which is a coldhearted news field among these. For example, lot control, a disk number, etc. of disk manufacture are modulated, or the desired sign etc. are recorded as the radial bar code 20.

[0014]The composition of the disk 30 of this gestalt is shown in drawing 1. Drawing 1 (A) is a sectional view of a diameter direction, and (B) is an enlarged drawing of the principal part. The general-view figure of the disk 30 is shown in drawing 3. In these figures, it is the same as that of the background art of drawing 2 about the central center hall 12 and the clamp region 14. Next, about the specular surface area 32, the radial bar code 34 is formed in the inner circumference side, and the concentric-circle-shape bar code 36 is formed in the periphery side. The radial bar code 34 is the same bar code as the background art mentioned above. The concentric-circle-shape bar code 36 is constituted by the pit sequence, and if it combines with the adjoining mirror plane portion, an exterior will be observed as a set of the ring of concentric circle shape. If this concentric-circle-shape bar code 36 is seen from the diameter direction of the disk 30, the abnormal conditions as a bar code are performed.
[0015]The information area 18 of the outside of the above coldhearted news field is the same as that of said background art. That is, it is divided into each field of the lead-in groove field 38, the data area 40, and the lead-out field 42 from the inner circumference side. The start sector number of the user datum, etc. are recorded [whether it is rewritable whether it is the physical layer management information of a disk, for example, read-only, and] on the lead-in groove field 38. The data area 40 is a field which a user mainly uses, and an user datum, a game program, etc. are recorded, for example. Non-sound data etc. are recorded on the lead-out field 42. This lead-out field 42 shows the end of data, and is a margin portion from the last of the record section of data to a disk outermost periphery.
[0016]Next, the reading operation of said bar codes 34 and 36 in the reproduction means of the disk 30 is explained. When reading the radial bar code 34, it fixes and a pickup (not shown) rotates the disk 30. Thereby, the beam spot of a pickup moves from position Pa of drawing 3 to the position Pb. Next, when reading the concentric-circle-shape bar code 36, while rotating the disk 30 similarly, only the width of the diameter direction of the concentric-circle-shape bar code 36 makes a pickup seek. As a result, the locus of the beam spot will move from position Pa of drawing 3 to the position Pc, and will cross the concentric-circle-shape bar code 36 aslant.
[0017]Light volume change when a bar code is traced as mentioned above, and change of a tracking error are the signals by which bar code abnormal conditions were carried out, read this and decode it to security information. What kind of thing may be sufficient as the product number of the disk, the character like JP,6-282931,A "ABC" or other signs with any sufficient for example, security information itself, etc. It cannot be necessary to read the format of the pit formed parts of the concentric-circle-shape bar code 36 in particular with the playback equipment mentioned later. That is, it is good also as a special format unanalyzable with playback equipment, and may be made for playback equipment to raise security as the same format as other signal parts in which analysis is possible.
[0018]Next, the composition of the discernment and playback equipment concerning this gestalt is explained, referring to drawing 4. In the figure, the signal output side of the pickup 50 for reading the pit string data recorded on the disk 30 is connected to the amplifier 52 and 54. The RF signal output side of the amplifier 52 is connected to the RF signal processor 56 and the radial bar code decoder 58, respectively. The tracking error signal output side of the amplifier 54 is connected to the servo processor 60 and the rectification circuit 62. The output side of the RF signal processor 56 is connected to the post-processing system (not shown) via the decoding processing system 64. The servo output side of said servo processor 60 is fed back to the pickup 50 or the spindle motor 66.
[0019]The output side of said rectification circuit 62 is connected to the disk processor 74 via the series circuit of the low pass filter 68, the comparator 70, and the concentric-circle-shape bar code decoder 72. The security information memory 76 is connected to this disk processor 74. The disk processor 74 is connected also to the RF signal processor 56, the servo processor 58, the radial bar code decoder 58, and the host processor (not shown), respectively.
[0020]The pickup 50 is for reading pit string data in the signal recording surface of the disk 30

among the above each part. In the RF signal processor 56, the DEINTA reeve of the data read by the pickup 50, an error correction, and decoding are performed. In the signal decoding system 64, decoding of the decoded main data is performed in accordance with standards, such as MPEG, and a picture signal and an audio signal are acquired by this. On the other hand, in the servo processor 60, based on the signal input from the amplifier 54, the pickup 50 and servo control of the spindle motor 66 are performed so that the optical beam of the pickup 50 may trace a pit sequence.

[0021]The disk processor 74 for exclusive use is used for such disk control. On the other hand, for example, the host processor is provided as a main CPU for games, and the disk processor 74 and division of work are performed. Security information is beforehand stored in the memory 76 of the disk processor 74. As security information, each data of the pit sequence of the radial bar code 34, the concentric-circle-shape bar code 36, and the track in a concentric circle is stored.

[0022]The radial bar code decoder 58 decodes the radial bar code 34 based on the sum total of an RF signal, i.e., a light intensity signal. As the concrete technique of decoding of the radial bar code 34, it is explained by the Japanese-Patent-Application-No. No. 277448 [eight to] gazette in full detail, for example. Although the same light intensity signal may be sufficient as the concentric-circle-shape bar code decoder 72, it has decoded the concentric-circle-shape bar code 36 based on the tracking error signal for servos with this gestalt. That is, a tracking error signal is first rectified and direct-current-ized by the rectification circuit 62. Then, a rectification signal is binary-ized by the comparator 70, after an unnecessary signal component is removed by the low pass filter 68 (digitization). The digitized signal is decoded by the concentric-circle-shape bar code decoder 72. If a bar code format is carried out in common by the radial bar code and a concentric-circle-shape bar code, although the bar code decoders 58 and 72 can be shared, they have separate composition with this gestalt so that it can respond, even if formats differ.

[0023]Next, operation of the disk discernment which is characteristic operation of this gestalt is explained, referring to drawing 5 and drawing 6. Drawing 5 (B) - (D) is a main signal waveform and the flow chart of drawing 6 mainly shows operation of the disk processor 74. A set of the disk 30 will perform initial setting for disk data read (Step S12). (Y of drawing 6 and Step S10) While rotating the disk 30 with the spindle motor 66, servo control by the servo processor 60 is performed, and, specifically, it changes into the state which the pit string data based on the pickup 50 can read. The disk processor 74 performs [outputting a laser beam from the pickup 50 and accessing the lead-in groove field 38, and] directions of operation.

[0024]Next, the disk processor 74 directs to seek the pickup 50 to inner circumference rather than the lead-in groove field 38. The pickup 50 scans in the direction of Pa to Pb in drawing 3, and the radial bar code 34 is read by this (Step S14). The signal read by the pickup 50 is supplied to the radial bar code decoder 58 via the amplifier 52, is decoded here, and is outputted to the disk processor 74. In the disk processor 74, it is judged whether the decoded result of the inputted radial bar code 34 and the security information beforehand stored in the memory 76 are in agreement. As a result, it identifies that it is (N of Step S16) when both are not in agreement, and the disk is a copy article, and a disk is discharged (Step S18). Or that is told to a host processor and the decoding processing by the decoding processing system 64 is suspended. Conversely, when both are in agreement, it progresses to (Y of Step S16), and the following step.

[0025]The disk processor 74 directs to move the pickup 50 to the periphery side a little in order to read the concentric-circle-shape bar code 36 next. As shown in drawing 5 (A), the pickup 50 seeks from Pa to the periphery side by the width of the concentric-circle-shape bar code 36 to Pc, and the concentric-circle-shape bar code 36 is read by this (Step S20). The locus of the beam spot at this time is shown in drawing 5 (A). As the tracking error signal read by such scan is shown in drawing 5 (B), a track passage signal is outputted in pit formed parts, and a signal is not outputted in a mirror plane portion. If this signal is removed in the rectification circuit 62 and a high frequency component is removed by the ready sink and also the low pass filter 68, it will become the signal mostly binary-ized as shown in drawing 5 (C). This is digitized by the comparator 70 as shown in

drawing 5 (D).

[0026]This digital signal is supplied to the concentric-circle-shape bar code decoder 72, is decoded here, and is outputted to the disk processor 74. In the disk processor 74, it is judged whether the decoded result of the inputted concentric-circle-shape bar code 36 and the security information beforehand stored in the memory 76 are in agreement. As a result, it identifies that it is (N of Step S22) when both are not in agreement, and the disk is a copy article, and a disk is discharged (Step S18). Or that is told to a host processor and the decoding processing by the decoding processing system 64 is suspended. Conversely, when both are in agreement, it progresses to (Y of Step S22), and the following step.

[0027]The disk processor 74 directs to move the pickup 50 onto a concentric circle track in order to read the information currently recorded on the concentric circle track by the pit sequence next. A concentric circle track is read by this (Step S24). A reading signal is supplied to the RF signal processor 56, and the decipherment is performed here. The disk processor 74 is supplied, a note of a result is made similarly and it is compared with the security information memorized by 76. As a result, it identifies that it is (N of Step S26) when both are not in agreement, and the disk is a copy article, and a disk is discharged (Step S18). Or that is told to a host processor and the decoding processing by the decoding processing system 64 is suspended. Conversely, it is judged that it is (Y of Step S26) when both are in agreement, and the disk is a regular article, and ordinary reproduction is performed (Step S28). For example, the user file of the data area 40 is read and operation of starting game application is performed.

[0028]Thereby, the following effects are acquired.

(1) Usually, the portion of the coldhearted news field which is not accessed is not copied. For this reason, even if it copies the disk of this gestalt, security information cannot be detected, and main information is not played, either. Therefore, very effective anti-copying becomes possible.

[0029](2) it is called a bar code -- semi- -- it is the logical record technique and it is not necessary to add a function like pit WOBURU operated in analog to a disk manufacturing installation It can respond to a disk manufacturing installation with the equipment in which it is only comparatively simple that the recording function to a coldhearted news field may be added. A disk manufacturing cost is also cheap.

[0030](3) With the title and lot of a disk, it is possible to change the existence and the contents of security information of a radial and a concentric-circle-shape bar code, or its pit string data, and also change processing can also be performed in real time on a production line. With those combination, the kind of much security information can be made and without limit firm security can be realized. That is, since security information will differ with other lots and products even if the security information of the disk of one sheet is analyzed, there is no possibility that the security information of all products may be analyzed at once.

[0031](4) Each of radials and concentric-circle-shape bar codes is low recording densities, and is recorded on a large area. For this reason, it can also be checked whether it is a regular disk, without checking a bar code visually and needing a discernment machine, and is dramatically simple. Since the existence of these bar codes itself is clear, there is also an advantage of being hard to notice that they are security information on the contrary.

[0032](5) Since the playback equipment of main information is the same as that of the usual thing, it can use as it is what was LSI-ized. It can respond to disk discernment by improvement of only the firmware of a disk processor, and is advantageous to it in cost.

[0033](6) It is operation of a coldhearted news field of not being related to main information, and is not processed into an user datum at all. Therefore, the reliability of an user datum is secured as it is.

[0034]It is possible for there to be many embodiments in this invention and to change to Oshi based on the above indication. For example, the following is also contained.

(1) Although the pit sequence in a radial bar code, a concentric-circle-shape bar code, and a

concentric-circle-shape bar code was used as security information, only any one of them may be used or it may be made to combine two in said gestalt. Thus, it can be considered as the security according to the grade of the demand by considering it as various combination.

[0035](2) The recording format of a radial and a concentric-circle-shape bar code is good also as common, and good also as another format. If it is considered as a compatible format, a decoder can be used in common and an equipment configuration can be simplified. When it is another format, it will read by a separate decoder, but there is an advantage that the analysis of security information becomes difficulty more. The same may be said of the contents of the bar code, and it is good also as common in the contents of record of a radial and a concentric-circle-shape bar code, and good also as contents of another.

[0036](3) Although said gestalt is an example of a single-sided disk, this may be applied to the disk of double-sided lamination structure in each field, respectively.

[0037](4) Although said gestalt made the common optical disc the example, if a coldhearted news field exists, it is applicable to various kinds of recording media, such as CD-ROM, a mini disc, an MO disk, DVD(Digital Video Disc)-ROM, and a magnetic disk.

[0038]

[Effect of the Invention]As explained above, according to this invention, since the concentric-circle-shape bar code and the radial bar code were formed in the coldhearted news field and the contents of the pit sequence of they and a concentric-circle-shape bar code were made into security information, there are the following effects.

(1) An illegal copy can be identified good and the prevention can be aimed at.

(2) It can respond with simple equipment, and also compatibility can also be maintained.

(3) Firm security is realizable by various security information.

(4) Also by viewing, a regular article and an illicit article are easily distinguishable.

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TECHNICAL FIELD

[Field of the Invention]This invention relates to the improvement to the suitable copy security for the optical disc in which a disk, its identifying method and device, and its playback equipment were started, especially the software for TV games was stored, its discernment, and its playback.

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EFFECT OF THE INVENTION

[Effect of the Invention]As explained above, in this invention, the concentric-circle-shape bar code and the radial bar code were formed in the coldhearted news field, and the contents of the pit sequence of they and a concentric-circle-shape bar code were made into security information. Therefore, there are the following effects.

(1) An illegal copy can be identified good and the prevention can be aimed at.
(2) It can respond with simple equipment, and also compatibility can also be maintained.
(3) Firm security is realizable by various security information.
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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention]By the way, the consideration from the following viewpoints is needed for prevention of an illegal copy.
(1) It is preferred for security information not to be outputted as main information, but to prevent from discovering from the outside as a basic function of security information record. That is, when it sees from the bus and OS level besides un-visible data and devices, such as SCSI, from the outside of the signal processor of disk data, it records on a disk by using meaningless data as security data, and it is made not to be outputted from the processing unit of main information.
[0007](2) Security information is made not to be reproduced even if it manufactures the disk of an illegal copy based on the data of the main information outputted from the processing unit of the disk. Security information can be read certainly and it enables it to regenerate it normally with a regular processing unit.
[0008](3) Although it is not indispensable, if the compatibility on a standard is maintained based on the physical standard of a disk, the possibility as disk resources, such as concomitant use of a manufacturing installation, increases, and it is desirable. For example, compatibility is maintained by considering it as the physical standard of the disk corresponding to a CD player, the CD-ROM drive of a personal computer, etc., and the same standard.
[0009]However, since the bar code indicated by said JP,6-203412,A is very easy to reproduce, the anti-copying capability is low. Therefore, it is necessary to add security information and to reinforce anti-copying capability. In this case, the optical reproduction means which the usual reproduction machine has can use it as it is, and, as for the addition of new hardware, stopping at the minimum is desirable. It is convenient if it can specifically divert to the record reproduction of the security information which adds the record reproduction means of said bar code as it is. Like said bar code, when it can be checked visually whether it is a regular disk, it is still more convenient.
[0010]While this invention was originated from these viewpoints, and the purpose identifies an illegal copy good and aiming at the prevention, it is being able to respond with simple equipment and also also maintaining compatibility. Other purposes are to realize firm security by various security information. Other purposes are to distinguish simply whether it is a regular article also by viewing.

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MEANS

[Means for Solving the Problem]In order to attain said purpose, a disk of this invention recorded a concentric-circle-shape bar code and a radial bar code which make security information the contents on a coldhearted news field. According to one of the main gestalten, said concentric-circle-shape bar code is formed of a pit sequence which makes security information the contents. Disk discernment of this invention is performed by storing beforehand the contents of security information of a pit sequence of said concentric-circle-shape bar code, a radial bar code, or a concentric-circle-shape bar coat in a memory, and comparing the contents and the contents of storing of a memory which were read.
[0012]The above and other purposes of this invention, the feature, and an advantage will become clear from the following detailed explanation and an accompanying drawing.
[0013]
[Embodiment of the Invention]Hereafter, an embodiment of the invention is described in detail. First, in order to make an understanding of this invention easy, the most-inner-circumference portion of the optical disc indicated by JP,6-203412,A mentioned above is explained with reference to drawing 2. The center hall 12 for inserting in the axis of rotation (not shown) is established in the center of the disk 10. The clamp region 14 which does not act as a data storage area is established in the outside. The specular surface area 16 which has a data recording layer is established in the outside. The outside serves as the information area 18, and main information, such as music, an image, and a program, is recorded. The bar code 20 is formed in the specular surface area 16 which is a coldhearted news field among these. For example, lot control, a disk number, etc. of disk manufacture are modulated, or the desired sign etc. are recorded as the radial bar code 20.
[0014]The composition of the disk 30 of this gestalt is shown in drawing 1. Drawing 1 (A) is a sectional view of a diameter direction, and (B) is an enlarged drawing of the principal part. The general-view figure of the disk 30 is shown in drawing 3. In these figures, it is the same as that of the background art of drawing 2 about the central center hall 12 and the clamp region 14. Next, about the specular surface area 32, the radial bar code 34 is formed in the inner circumference side, and the concentric-circle-shape bar code 36 is formed in the periphery side. The radial bar code 34 is the same bar code as the background art mentioned above. The concentric-circle-shape bar code 36 is constituted by the pit sequence, and if it combines with the adjoining mirror plane portion, an exterior will be observed as a set of the ring of concentric circle shape. If this concentric-circle-shape bar code 36 is seen from the diameter direction of the disk 30, the abnormal conditions as a bar code are performed.
[0015]The information area 18 of the outside of the above coldhearted news field is the same as that of said background art. That is, it is divided into each field of the lead-in groove field 38, the data area 40, and the lead-out field 42 from the inner circumference side. The start sector number of the user datum, etc. are recorded [whether it is rewritable whether it is the physical layer management information of a disk, for example, read-only, and] on the lead-in groove field 38. The

data area 40 is a field which a user mainly uses, and an user datum, a game program, etc. are recorded, for example. Non-sound data etc. are recorded on the lead-out field 42. This lead-out field 42 shows the end of data, and is a margin portion from the last of the record section of data to a disk outermost periphery.

[0016]Next, the reading operation of said bar codes 34 and 36 in the reproduction means of the disk 30 is explained. When reading the radial bar code 34, it fixes and a pickup (not shown) rotates the disk 30. Thereby, the beam spot of a pickup moves from position Pa of drawing 3 to the position Pb. Next, when reading the concentric-circle-shape bar code 36, while rotating the disk 30 similarly, only the width of the diameter direction of the concentric-circle-shape bar code 36 makes a pickup seek. As a result, the locus of the beam spot will move from position Pa of drawing 3 to the position Pc, and will cross the concentric-circle-shape bar code 36 aslant.

[0017]Light volume change when a bar code is traced as mentioned above, and change of a tracking error are the signals by which bar code abnormal conditions were carried out, read this and decode it to security information. What kind of thing may be sufficient as the product number of the disk, the character like JP,6-282931,A "ABC" or other signs with any sufficient for example, security information itself, etc. It cannot be necessary to read the format of the pit formed parts of the concentric-circle-shape bar code 36 in particular with the playback equipment mentioned later. That is, it is good also as a special format unanalyzable with playback equipment, and may be made for playback equipment to raise security as the same format as other signal parts in which analysis is possible.

[0018]Next, the composition of the discernment and playback equipment concerning this gestalt is explained, referring to drawing 4. In the figure, the signal output side of the pickup 50 for reading the pit string data recorded on the disk 30 is connected to the amplifier 52 and 54. The RF signal output side of the amplifier 52 is connected to the RF signal processor 56 and the radial bar code decoder 58, respectively. The tracking error signal output side of the amplifier 54 is connected to the servo processor 60 and the rectification circuit 62. The output side of the RF signal processor 56 is connected to the post-processing system (not shown) via the decoding processing system 64. The servo output side of said servo processor 60 is fed back to the pickup 50 or the spindle motor 66.

[0019]The output side of said rectification circuit 62 is connected to the disk processor 74 via the series circuit of the low pass filter 68, the comparator 70, and the concentric-circle-shape bar code decoder 72. The security information memory 76 is connected to this disk processor 74. The disk processor 74 is connected also to the RF signal processor 56, the servo processor 58, the radial bar code decoder 58, and the host processor (not shown), respectively.

[0020]The pickup 50 is for reading pit string data in the signal recording surface of the disk 30 among the above each part. In the RF signal processor 56, the DEINTA reeve of the data read by the pickup 50, an error correction, and decoding are performed. In the signal decoding system 64, decoding of the decoded main data is performed in accordance with standards, such as MPEG, and a picture signal and an audio signal are acquired by this. On the other hand, in the servo processor 60, based on the signal input from the amplifier 54, the pickup 50 and servo control of the spindle motor 66 are performed so that the optical beam of the pickup 50 may trace a pit sequence.

[0021]The disk processor 74 for exclusive use is used for such disk control. On the other hand, for example, the host processor is provided as a main CPU for games, and the disk processor 74 and division of work are performed. Security information is beforehand stored in the memory 76 of the disk processor 74. As security information, each data of the pit sequence of the radial bar code 34, the concentric-circle-shape bar code 36, and the track in a concentric circle is stored.

[0022]The radial bar code decoder 58 decodes the radial bar code 34 based on the sum total of an RF signal, i.e., a light intensity signal. As the concrete technique of decoding of the radial bar code 34, it is explained by the Japanese-Patent-Application-No. No. 277448 [eight to] gazette in full detail, for example. Although the same light intensity signal may be sufficient as the concentric-circle-shape bar code decoder 72, it has decoded the concentric-circle-shape bar code 36 based

on the tracking error signal for servos with this gestalt. That is, a tracking error signal is first rectified and direct-current-ized by the rectification circuit 62. Then, a rectification signal is binary-ized by the comparator 70, after an unnecessary signal component is removed by the low pass filter 68 (digitization). The digitized signal is decoded by the concentric-circle-shape bar code decoder 72. If a bar code format is carried out in common by the radial bar code and a concentric-circle-shape bar code, although the bar code decoders 58 and 72 can be shared, they have separate composition with this gestalt so that it can respond, even if formats differ.

[0023]Next, operation of the disk discernment which is characteristic operation of this gestalt is explained, referring to drawing 5 and drawing 6. Drawing 5 (B) - (D) is a main signal waveform and the flow chart of drawing 6 mainly shows operation of the disk processor 74. A set of the disk 30 will perform initial setting for disk data read (Step S12). (Y of drawing 6 and Step S10) While rotating the disk 30 with the spindle motor 66, servo control by the servo processor 60 is performed, and, specifically, it changes into the state which the pit string data based on the pickup 50 can read. The disk processor 74 performs [outputting a laser beam from the pickup 50 and accessing the lead-in groove field 38, and] directions of operation.

[0024]Next, the disk processor 74 directs to seek the pickup 50 to inner circumference rather than the lead-in groove field 38. The pickup 50 scans in the direction of Pa to Pb in drawing 3, and the radial bar code 34 is read by this (Step S14). The signal read by the pickup 50 is supplied to the radial bar code decoder 58 via the amplifier 52, is decoded here, and is outputted to the disk processor 74. In the disk processor 74, it is judged whether the decoded result of the inputted radial bar code 34 and the security information beforehand stored in the memory 76 are in agreement. As a result, it identifies that it is (N of Step S16) when both are not in agreement, and the disk is a copy article, and a disk is discharged (Step S18). Or that is told to a host processor and the decoding processing by the decoding processing system 64 is suspended. Conversely, when both are in agreement, it progresses to (Y of Step S16), and the following step.

[0025]The disk processor 74 directs to move the pickup 50 to the periphery side a little in order to read the concentric-circle-shape bar code 36 next. As shown in drawing 5 (A), the pickup 50 seeks from Pa to the periphery side by the width of the concentric-circle-shape bar code 36 to Pc, and the concentric-circle-shape bar code 36 is read by this (Step S20). The locus of the beam spot at this time is shown in drawing 5 (A). As the tracking error signal read by such scan is shown in drawing 5 (B), a track passage signal is outputted in pit formed parts, and a signal is not outputted in a mirror plane portion. If this signal is removed in the rectification circuit 62 and a high frequency component is removed by the ready sink and also the low pass filter 68, it will become the signal mostly binary-ized as shown in drawing 5 (C). This is digitized by the comparator 70 as shown in drawing 5 (D).

[0026]This digital signal is supplied to the concentric-circle-shape bar code decoder 72, is decoded here, and is outputted to the disk processor 74. In the disk processor 74, it is judged whether the decoded result of the inputted concentric-circle-shape bar code 36 and the security information beforehand stored in the memory 76 are in agreement. As a result, it identifies that it is (N of Step S22) when both are not in agreement, and the disk is a copy article, and a disk is discharged (Step S18). Or that is told to a host processor and the decoding processing by the decoding processing system 64 is suspended. Conversely, when both are in agreement, it progresses to (Y of Step S22), and the following step.

[0027]The disk processor 74 directs to move the pickup 50 onto a concentric circle track in order to read the information currently recorded on the concentric circle track by the pit sequence next. A concentric circle track is read by this (Step S24). A reading signal is supplied to the RF signal processor 56, and the decipherment is performed here. The disk processor 74 is supplied, a note of a result is made similarly and it is compared with the security information memorized by 76. As a result, it identifies that it is (N of Step S26) when both are not in agreement, and the disk is a copy article, and a disk is discharged (Step S18). Or that is told to a host processor and the decoding

processing by the decoding processing system 64 is suspended. Conversely, it is judged that it is (Y of Step S26) when both are in agreement, and the disk is a regular article, and ordinary reproduction is performed (Step S28). For example, the user file of the data area 40 is read and operation of starting game application is performed.

[0028]Thereby, the following effects are acquired.

(1) Usually, the portion of the coldhearted news field which is not accessed is not copied. For this reason, even if it copies the disk of this gestalt, security information cannot be detected, and main information is not played, either. Therefore, very effective anti-copying becomes possible.

[0029](2) it is called a bar code -- semi- -- it is the logical record technique and it is not necessary to add a function like pit WOBURU operated in analog to a disk manufacturing installation It can respond to a disk manufacturing installation with the equipment in which it is only comparatively simple that the recording function to a coldhearted news field may be added. A disk manufacturing cost is also cheap.

[0030](3) With the title and lot of a disk, it is possible to change the existence and the contents of security information of a radial and a concentric-circle-shape bar code, or its pit string data, and also change processing can also be performed in real time on a production line. With those combination, the kind of much security information can be made and without limit firm security can be realized. That is, since security information will differ with other lots and products even if the security information of the disk of one sheet is analyzed, there is no possibility that the security information of all products may be analyzed at once.

[0031](4) Each of radials and concentric-circle-shape bar codes is low recording densities, and is recorded on a large area. For this reason, it can also be checked whether it is a regular disk, without checking a bar code visually and needing a discernment machine, and is dramatically simple. Since the existence of these bar codes itself is clear, there is also an advantage of being hard to notice that they are security information on the contrary.

[0032](5) Since the playback equipment of main information is the same as that of the usual thing, it can use as it is what was LSI-ized. It can respond to disk discernment by improvement of only the firmware of a disk processor, and is advantageous to it in cost.

[0033](6) It is operation of a coldhearted news field of not being related to main information, and is not processed into an user datum at all. Therefore, the reliability of an user datum is secured as it is.

[0034]It is possible for there to be many embodiments in this invention and to change to Oshi based on the above indication. For example, the following is also contained.

(1) Although the pit sequence in a radial bar code, a concentric-circle-shape bar code, and a concentric-circle-shape bar code was used as security information, only any one of them may be used or it may be made to combine two in said gestalt. Thus, it can be considered as the security according to the grade of the demand by considering it as various combination.

[0035](2) The recording format of a radial and a concentric-circle-shape bar code is good also as common, and good also as another format. If it is considered as a compatible format, a decoder can be used in common and an equipment configuration can be simplified. When it is another format, it will read by a separate decoder, but there is an advantage that the analysis of security information becomes difficulty more. The same may be said of the contents of the bar code, and it is good also as common in the contents of record of a radial and a concentric-circle-shape bar code, and good also as contents of another.

[0036](3) Although said gestalt is an example of a single-sided disk, this may be applied to the disk of double-sided lamination structure in each field, respectively.

[0037](4) Although said gestalt made the common optical disc the example, if a coldhearted news field exists, it is applicable to various kinds of recording media, such as CD-ROM, a mini disc, an MO disk, DVD(Digital Video Disc)-ROM, and a magnetic disk.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1]It is a figure showing the composition of the disk of one gestalt of this invention.
[Drawing 2]It is an outline view showing the disk of a background art.
[Drawing 3]It is a figure showing the appearance of the disk of said gestalt.
[Drawing 4]It is a block diagram showing the principal part of discernment and playback equipment of this gestalt.
[Drawing 5]It is a figure showing the signal wave form of the principal part of said discernment and playback equipment.
[Drawing 6]It is a flow chart which shows the main operation of the disk processor of said discernment and playback equipment.
[Description of Notations]
10, 30 -- Disk
12 -- Center hole
14 -- Clamp region
16, 32 -- Mirror plane ****
18 -- Information area
34 -- Radial bar code
36 -- Concentric-circle-shape bar code
38 -- Lead-in groove field
40 -- Data area
42 -- Lead-out field
50 -- Pickup
52, 54 -- Amplifier
56 -- RF signal processor
58 -- Radial bar code decoder
60 -- Servo processor
62 -- Rectification circuit
66 -- Spindle motor
68 -- Low pass filter
70 -- Comparator
72 -- Concentric-circle-shape bar code decoder
74 -- Disk processor
76 -- Memory

[Translation done.]

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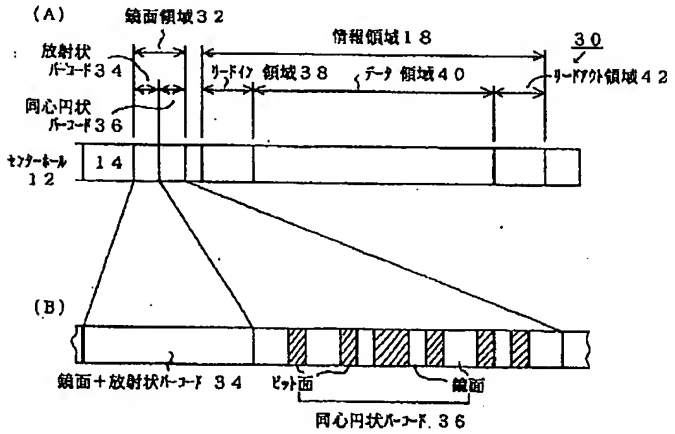
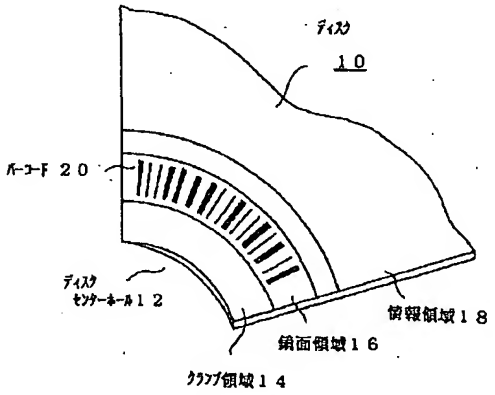
DRAWINGS

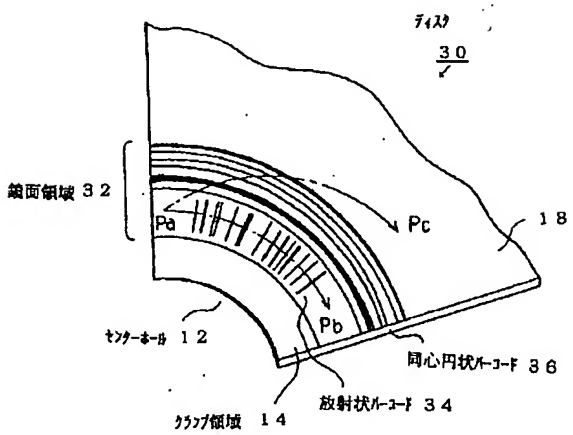
[Drawing 1]



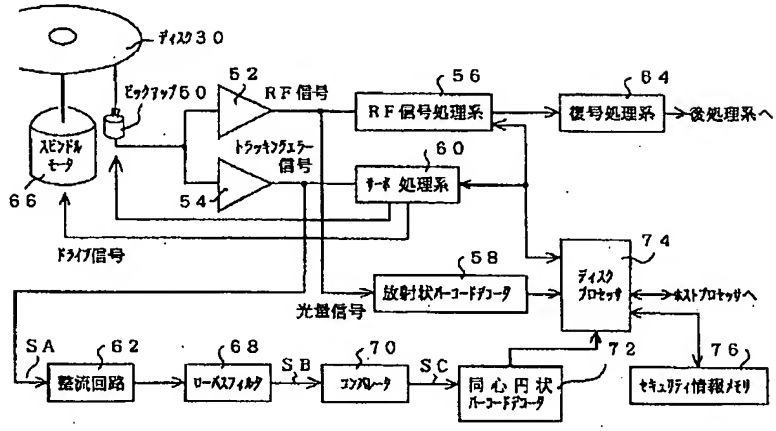
[Drawing 2]



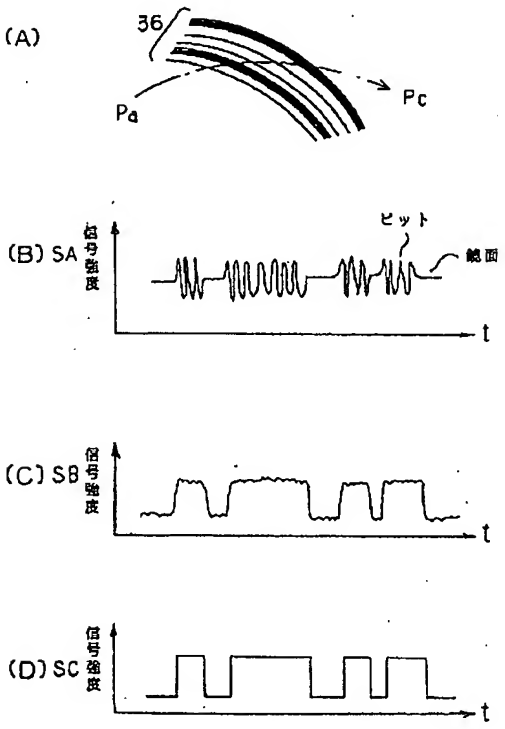
[Drawing 3]



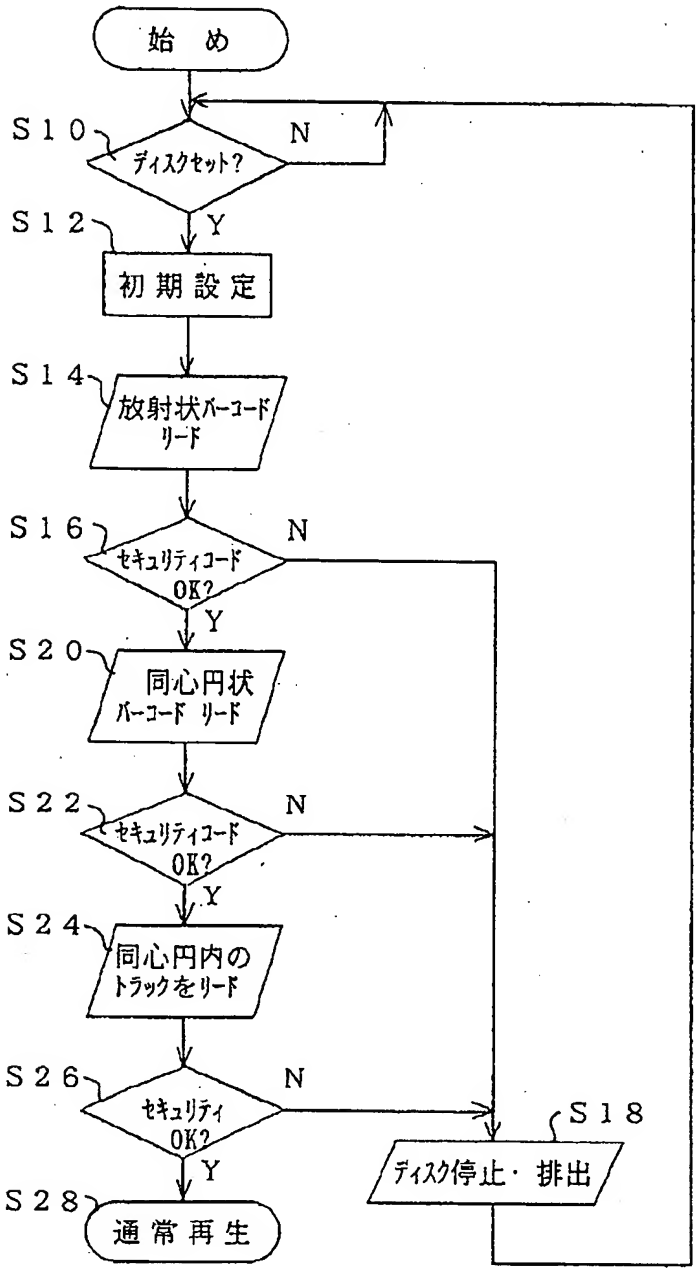
[Drawing 4]



[Drawing 5]



[Drawing 6]



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